Thematic Investing

Powering AI: New Amazon Data Center Water Disclosure Implies High Electricity Use

New Amazon disclosure on water use and its data cooling strategy echoes many of the key points we recently made in our DC cooling and water use deep dive, plus enables us to back into the company's implied 2025 DC electricity use at ~91 TWh.

It's possible that Amazon may have read our recent data center cooling and water use deep dive. In a recent post, AMZN provided new disclosure on its water use and data center cooling strategy, which reinforced our key point around the electricity-water trade-off with evaporative cooling.[1] Importantly, by disclosing both data center water withdrawals and Water Use Effectiveness (WUE), we can back into AMZN's data center electricity use, which it hasn't historically disclosed. Based on this, we estimate ~91 TWh of total data center electricity use in 2025, a materially higher figure than peers in 2024 (META ~18 TWh, MSFT ~30 TWh, GOOG ~32 TWh).[2] Assuming a 1.15 Power Usage Effectiveness (PUE) ratio and 70% utilization, 91 TWh implies ~13 GW of IT compute capacity. Recall that AMZN added ~3.9 GW of compute in 2025 with capacity up 2x vs. 2022 levels and plans to 2x its capacity again by 2027.

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William Thompson
+1 212 526 8641
william.s.thompson@barclays.com
BCI, US

Hannah Greenberg
+1 212 526 2457
hannah.greenberg@barclays.com
BCI, US

Hiral Patel
+44 (0)20 3134 1618
hiral.patel@barclays.com
Barclays, UK

Laia Marin i Sola, CFA
+ 44 (0)20 3134 2531
laia.marin@barclays.com
Barclays, UK

Katherine Ogundiya
+44 (0)20 3134 1391
katherine.a.ogundiya@barclays.com
Barclays, UK

Amy Lian
+44 (0)20 3134 0179
amy.lian@barclays.com
Barclays, UK

Siddharth Gupta
+91 22 6175 2540
siddharth.gupta1@barclays.com
Barclays, UK

Please see analyst certifications and important disclosures beginning on page 5.

[1] Amazon (AMZN) is covered by Ross Sandler

[2] Meta (META) and Alphabet (GOOG) are covered by Ross Sandler. Microsoft (MSFT) is covered by Raimo Lenschow.

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AMZN again improved its water use efficiency. AMZN reports that its global data center operations withdrew ~2.5 billion gallons (~9.5bn liters) of water in 2025, with withdrawals at sites it owns and operates declining ~2% YoY, despite continued expansion. The company also disclosed a global WUE of 0.12 L/kWh in 2025, down from 0.15 L/kWh in 2024. AMZN attributes these improvements to:

- Years of investment in custom cooling technology, smarter systems, and a commitment to minimize water use wherever possible.
- Steadily raising the temperature thresholds at which its data centers operate, while designing servers to tolerate more heat. Higher allowable server operating temperatures allows it to maximize “free air cooling” for the majority of the year (~90%), while relying on water use for evaporative cooling only during the hottest and most humid days.

AMZN also explicitly defended its use of water for evaporative cooling, rather than relying more heavily on energy-intensive mechanical chillers (i.e., large air conditioning systems). The company notes that, "with currently available technology, using water during hot hours actually reduces overall environmental and community impact," since the chillers typically require 25-35% more electricity, and that extra power demand often occurs when the grid is constrained. This echoes the key points we outlined in Powering AI: Demystifying Data Center Cooling & Water Use:

- **Evaporative cooling—not liquid cooling—is the primary driver of direct (on-site) water use in data centers.** Liquid cooling systems are typically closed-loop: once filled, the coolant is continuously recirculated and not consumed during normal operation. By contrast, evaporative cooling is a long-standing HVAC technique that removes heat by converting water into vapor, resulting in net water consumption to the atmosphere. While this process increases direct water use, it can significantly reduce electricity demand by lowering reliance on energy-intensive mechanical cooling systems (e.g., compressors, chillers, and high-power fans).
- **It’s not simply a matter of “less direct water use is better.”** Data center cooling and water use decisions involve a multidimensional trade-off between electricity demand, direct (on-site) water use, and indirect (upstream) water use and emissions for power generation. Minimizing direct water use be eliminating evaporative cooling can increase electricity demand, which may drive higher emissions and greater upstream water consumption, given the water intensity of thermoelectric power generation (e.g., natural gas, coal, and nuclear). For example, Meta’s embedded water consumption from purchasing electricity was nearly 13x its direct facility water use in 2024.

- **Hyperscalers strategies have started to diverge on their approach to data center cooling and water use.** META and MSFT have begun to prioritize minimal direct (on-site) water use, accepting modestly higher electricity use. In contrast, GOOG and AMZN have indicated they'll continue to use water selectively in lower-risk regions to mitigate higher emissions and indirect (upstream) water use.

It is worth noting that an AWS data center in Virginia incurred a "thermal event" that disrupted services for FanDuel and Coinbase.[3]

New disclosure suggests AMZN's data centers may have used ~91 TWh of electricity in 2025. Unlike its hyperscaler peers, AMZN does not directly disclose its electricity consumption. However, by providing both data center water withdrawals and its Water Usage Effectiveness (WUE) ratio, we can approximate its electricity demand. WUE is defined as the annual volume of water withdrawn divided by annual IT electricity consumption.

FIGURE 1. Analysis on data center water and electricity use

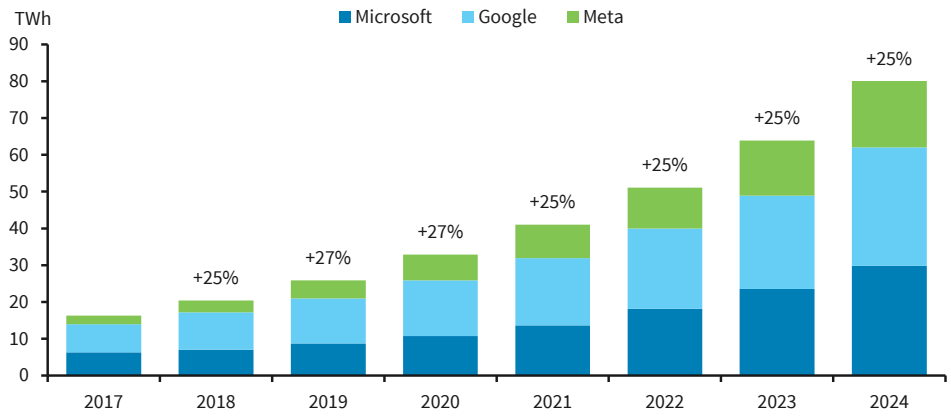
Metrics	Amazon (2025)	Meta (2024)	Microsoft (2024)	Google (2024)
Total water withdrawal (megaliters)		5,637	10,377	41,681
% DC water withdrawal		74%	75%	90%
DC water withdrawal (megaliters)	9,464	4,145	7,783	37,347
WUE (L/kWh)	0.12	0.19	0.3	NA
Implied IT electricity use (TWh)	78.9	21.8	25.9	
Power usage effectiveness (PUE)	1.15	1.08	1.16	1.09
Implied DC electricity use (TWh)	**91**	**24**	**30**	
Reported DC electricity use (TWh)		18.1		32.1
Reported total electricity use (TWh)		18.4	29.8	30.8

Red text = assumptions
Source: Company reports & Barclays Research

Dividing ~9.5bn liters of water withdrawal by AMZN's reported WUE of 0.12 L/kWh implies ~79 TWh of IT electricity demand in 2025. Applying an assumed PUE of ~1.15 (consistent with AMZN's 2022–2024 disclosures) implies ~91 TWh of total data center electricity demand. For comparison, META, MSFT, and GOOG reported ~18 TWh, ~30 TWh, and ~32 TWh of total electricity demand in 2024, respectively. At this level, AMZN's data center electricity footprint would rank among the top ~40 countries globally by electricity consumption.

[3] CNBC: AWS data center outage hits trading on FanDuel, Coinbase — recovery to take hours

FIGURE 2. Hyperscaler global electricity use



Meta (data center electricity only); Alphabet (all electricity); Microsoft (all electricity).
Source: Company reports & Barclays Research.

Could our math be off? Directionally, it shouldn't be—but there are caveats. AMZN's reported data center water withdrawals may not perfectly align with the WUE numerator definition (which primarily captures cooling-related water use), and hyperscaler electricity disclosures are not fully standardized. Apply the same calculations for META and MSFT (GOOG doesn't disclose its WUE), our implied DC electricity use for MSFT in 2024 closely reconciles with the company's reported total electricity use, while our implied DC electricity use for META in 2024 is 30% above the company's reported total data center electricity use (Figure 1).